



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,505	10/30/2003	Yasuo Takebe	61352-046	5764
7590	07/09/2009			
MCDERMOTT, WILL & EMERY 600 13th Street, N.W. Washington, DC 20005-3096			EXAMINER	
			ALEJANDRO, RAYMOND	
ART UNIT	PAPER NUMBER			
	1795			
MAIL DATE	DELIVERY MODE			
07/09/2009	PAPER			

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/696,505	Applicant(s) TAKEBE ET AL.
	Examiner Raymond Alejandro	Art Unit 1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 22 May 2009.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-79 and 82-109 is/are pending in the application.
 4a) Of the above claim(s) 1-79, 82-106, 108 and 109 is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 107 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 03 October 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date 05/22/09.

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/22/09 has been entered.

This paper is issued in reply to applicant's communication accompanying the foregoing RCE. The rejection under Section 103 has not been overcome yet. Refer to the abovementioned amendment for more details concerning applicant's rebuttal arguments and remarks. Hence, pending claim 107 is again rejected over the same ground of rejection as composed infra on the written record:

Election/Restrictions and Claim Disposition

1. Claims 1-79 and 82-106 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 08/21/06.
2. Claims 108-109 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 05/02/08 and office action dated 07/02/08.

3. This application contains certain claims drawn to an invention nonelected with traverse in the reply filed on 05/02/08 and the office action of 07/02/08. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claim 107 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al 6068941 in view of Japanese publication JP 11-67252 (hereinafter referred to as the JP'252).

Figure 1 illustrates a fuel cell comprising an anode section 10-12, a cathode section 18-20, an electrolyte membrane 8, and flow field plates 2, 2' (Col 2, lines 10-25/Figure 1); and air line 32 for feeding air (Col 2, lines 38-41) and fuel line 24 for feeding fuel (COL 2, lines 30-35).

Fuller et al disclose a method of operating a fuel cell system having a cathode catalyst, and a cathode reactant flow field comprising: upon shut-down of the fuel cell, introducing a low molecular weight alcohol into the water circulating loop, and at the beginning of a start-up sequence introducing a limited flow of oxidant into said cathode reactant flow field to combust the methanol (CLAIM 5). Fuller et al disclose a proton exchange membrane fuel cell having a methanol or ethanol fed (*hydrocarbon based material*) fed into the coolant passages during shut-down, and that upon start-up, a controlled amount of air is fed through the cathode reactant flow field so that alcohol diffusing to the cathode catalyst is oxidized (ABSTRACT/ COL 1, lines 4-12/ CLAIM 5). *Note that methanol/ethanol are hydrocarbon-based material which are highly volatile. Further note that Fuller et al disclose that alcohol diffuses to the cathode catalyst. Still further note that the alcohol is introduced into the fuel cell upon shutdown thereof. Therefore, there is a presence of such a hydrocarbon-based material in the cathode upon shutdown of the fuel cell, and thus, restoring operation to decrease cathode potential necessarily occurs.*

Alternatively, Fuller et al also encompass start-up of fuel cell, notice also that start-up takes place after a shutdown operation. Thus, there is also a hydrocarbon-based material in the cathode "after terminating operation of the fuel cell".

Fuller et al disclose a method of operating a fuel cell system as described above. Nonetheless, the preceding prior art reference fails to expressly disclose supplying the specific gas for replacing oxygen and restoring the cathode.

The JP'252 divulges the use of city gas being reformed in a reformer 22 wherein part of the combustion exhaust gas from the reformer 22 is supplied to a housing 21 of a fuel cell 20 as a PURGE gas with a purge gas blower 38. Further disclosed therein is that during an emergency stop, the total amount of the flow rate of purge gas and the exhausting flow rate of the residual gas is controlled (ABSTRACT/FIGURES 1-2). *Thus, reformed city gas/combustion exhaust gas is used as a purge gas to purge the fuel cell. It is noted that purging the fuel cell system constitutes replacing fuel cell reactant such as oxygen or oxidant. It is also noted that reforming city gas to form reformed gas city does encompass processing the city gas through multiple gas processing devices including a desulfurizing unit.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time the invention was made to supply the specific gas for replacing oxygen and restoring the cathode in the fuel cell system of Fuller et al as taught by the JP'252 because the JP'252 directly teaches that purge gas such as reformed city gas/combustion exhaust gas is fed into the fuel cell housing during an emergency stop to regulate efficiency (i.e. temperature profile and operating cost) of the fuel cell system.

Additionally, the claim would have been obvious because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Stated differently, simple substitution of one known, equivalent element for another to obtain predictable results is *prima-facie* obvious (*i.e. substitution of the fuel cell anode for the fuel cell cathode*). *KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007)*. The claim would have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations. Stated differently, use of known technique to improve similar devices or features (methods, or products) in the same way is *prima-facie* obvious (*i.e. the fuel cell anode vs. the fuel cell cathode*). *KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007)*. In this case, the teachings of the JP'252 clearly shows using city gas for yielding the beneficial and predictable result of purging the fuel cell anode to regulate efficiency (*i.e. temperature profile and operating cost*) of the fuel cell system. Similarly, applying the city gas of the JP'252 to the fuel cell cathode would also yield the beneficial and predictable result of purging it to regulate efficiency (*i.e. temperature profile and operating cost*) of the fuel cell system.

Response to Arguments

8. Applicant's arguments filed 05/22/09 have been fully considered but they are not persuasive.
9. Applicant's main contention now gravitates around the assertion that Japanese-language publication "Reference 1" and "Reference 2" which have not been translated into English

language happen to identify “city gas” as “*a gas fed to a town as a fuel and is distinguished from a propane gas, or the like*”; that the term “*city gas means fuel gas which is fed to home, plants, etc and is a coal gas, a petroleum gas, or a liquefied natural gas, or a gas created by mixing them such that the resulting gas mixture has desired calories, or means a town gas*”. While applicant’s assertion about the meaning of “city gas” is found to be informative and is well-taken, the examiner is not fully convinced that the term “city gas”, in an absolute manner, carries applicant’s designated meaning. In support of this position, the examiner calls applicant’s attention to the following references (just to name a few) US 2009/0123796 (p0029), 2009/0117421 (p0025), 2009/0104486 (p0029), 2009/0104482 (p0004 & 0030) clearly indicating that “city gas” used as a raw fuel contains propane, butane in addition to other natural gases. On a side note regarding these references, it is imperative to note that ALL of the foregoing references claim FOREIGN priority from a Japanese publication document. Thus, the definition of the “city gas” in these references is pertinent to the meaning of the term “city gas” in Japan. Thus, it cannot be argued that the definition of the “city gas” in these references has been taken out of the context with respect to the meaning of such a term in Japan. Therefore, applicant’s assertion that the term “city gas” carries a different meaning in Japan is still insufficient and ineffective to overcome the ground of rejection supra. The examiner has demonstrated that the “city gas” used in Japan does contain, among other things, butane and/or propane. The above US references are presented herein just as evidentiary references for the purposes of understanding the meaning of a disputed term.

10. With respect to the rejection under Section 103 based upon Fuller et al'941 and the JP'252, applicant's arguments filed 05/22/09 have been fully considered but they are still unpersuasive.

11. The following constitutes a response to the arguments advanced by the applicant concerning Fuller et al'941 and JP'252. Applicant has provided three major line of reasoning against the sustained art rejection:

- a) *"Fuller teaches that alcohol is introduced to the coolant circuit at the time of shut-down, but does not describe whether or not the alcohol is introduced after termination of the feeding of the air (oxygen containing gas)"*;
- b) *"Fuller teaches that air is fed to the cathode at the time of start-up. As such, it is clear that Fuller fails to disclose the steps of terminating feeding of the oxygen-containing gas to the cathode and feeding a hydrocarbon gas that is a city gas, a propane gas or a butane gas after terminating feeding of the oxygen-containing gas to the cathode"*;
- c) *"JP'252 discloses that the combustion exhaust gas is used as a purge gas to purge the fuel cell. Exhaust gas of reformed city gas contains, as its major component, carbon dioxide - the result of combusting hydrocarbon gas. As such, exhaust gas, which is not considered "city gas" by those skilled in the art, is not a hydrocarbon gas"*.

In reply, the examiner notes that Fuller et al'941 contributes toward the rejection of the claimed subject matter because it makes known two basic aspect of the claimed invention: 1) the main structure of the fuel cell system being subject to the operating method, a limitation which has been given patentable weight even though the invention in question is directed to a method claim per se; and 2) the concept of shutting down the fuel cell or terminating operation thereof which

clearly implies terminating the feeding of air/oxidant as instantly claimed. So far, we all have seen that the disclosure of Fuller et al'941 embodies the structural characteristics of the fuel cell system and a step of terminating its operation. These teachings give us a reasonable framework to further formulate the last piece of the rejection, i.e. missing part of the claimed invention. To this end, JP'252 supplies substantiated teachings about using reformed-city-gas for purging the fuel cell in its entirety. The upshot of the teachings of JP'252 is that the reference discloses that it is known in the art to use at least city-gas for purging purposes in a fuel cell. Implicitly, these teachings imply that city-gas is fed to the cathode after terminating feeding of the oxygen-containing gas to the cathode. **Why?** Simply, because purging of a fuel cell generally does occur after stopping its operation, that is to say, after terminating feeding reactants to the fuel cell.

Therefore, in light of the particularity of each teaching and in combination thereof, it is not unreasonable to conclude that the **combination of Fuller et al'941 with JP'252** furnishes a method of operating a fuel cell comprising the specific structural features of the fuel cell, and further comprising the specific steps of: a) operating the fuel cell including feeding oxidant to the cathode; b) shutting down the fuel cell comprising terminating feeding oxidant to the cathode; and c) purging reformed-city gas to the entire fuel cell which encompasses feeding the hydrocarbon city gas to at least a portion of the cathode after stopping operation of the fuel cell or terminating feeding of the oxidant. This is the way the cited references have been applied together or in combination, and this explanation serves to rebut any applicant's argument whatsoever [i.e. *items (a), (b), (c) above*] stating that they do not teach, envision or encompass the concept of the claimed invention.

Specifically, items (a) and (c) themselves are helpful and crucial for arriving at the claimed invention without departing from the main concept of fuel cell operability. Thus, items (a) and (c) which applicant uses to rebut the *prima-facie* case of obviousness are given herein good use by the examiner as critical features, components or elements to formulate, compose and elaborate the essential framework of the legitimate obviousness rejection. As to item (b), it does not really add anything of significance to the patentability of the claimed method merely because the claimed method focus on the step of terminating/shutting-down operation of the fuel cell (i.e. terminating feeding of oxidant). Thus, the fact the Fuller et al feed oxidant to the cathode at the time of start-up is completely irrelevant to the claimed invention. Note that the present claims are wholly silent as to how the start-up of the fuel cell is conducted or if there is or there is not oxidant fed to the cathode at that particular time. Simply put, applicant's claims do not SPECIFY that oxidant or oxygen-containing gas is not fed to the cathode at the time of start-up. Thus, it is inappropriate to argue patentability of a limitation when that limitation is unclaimed.

12. On a side note, in item (c), applicant appears to be arguing that the city-gas of the JP'252 is not city-gas because of its ultimate composition as intended to be used therein. Point has been well-taken. Nonetheless, not a single-word is recited in independent claim 107 to describe the compositional nature of applicant's hydrocarbon city gas (other than desulfurized). Thus, the chemical composition of applicant's hydrocarbon city gas does not appear to be critical for his own invention because applicant does not define it. Accordingly, by following the same line of reasoning, the chemical composition of the reformed-city-gas of the JP'252 should not be critical as well. And given that no particular composition is required or needed to decrease the potential of the cathode as instantly intended, it is not unreasonable to conclude that the reformed-city gas

of the JP'252 is capable of decreasing the potential thereof in the same manner that applicant's compositionally-undefined city gas does it. Vis-à-vis, there are NO substantial differences between the city gases of applicant and JP'252 in terms of chemical composition. In JP'252, as explained above, the intended use of the city gas in the anode side (which is a purging gas) would also be suitable for the cathode side of the fuel cell; and the *predictable result* of purging the fuel cell cathode for regulating efficiency of the fuel cell system would be similarly attained.

See KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007).

13. As to other additional comments raised by the applicant concerning Fuller disclosing feeding methanol or ethanol into the coolant passage or the alcohol of Fuller (*not equivalent to the hydrocarbon gas of claim 107*), the fact that applicant has recognized another advantage or disadvantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Such arguments do not really add anything of significance to the patentability of the claimed method in light of the explanation provided by the Examiner in items 10-11 above (refer to items 10-11 supra). Additionally, note that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. (*emphasis supplied*→) Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or

motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

14. Regarding applicant's arguments concerning the rejection under Section 103 based upon Fuller et al and the JP'252, it is instructive to review what the secondary reference discloses:

*"The JP'252 divulges the use of city gas being reformed in a reformer 22 wherein part of the combustion exhaust gas from the reformer 22 is supplied to a housing 21 of a fuel cell 20 as a PURGE gas with a purge gas blower 38. Further disclosed therein is that during an emergency stop, the total amount of the flow rate of purge gas and the exhausting flow rate of the residual gas is controlled (ABSTRACT/FIGURES 1-2)." There is no dispute that the city gas in the JP'252 is fed to the anode. The Examiner agrees. But there is also no dispute what is the intended use of the city gas in the JP'252 which is to act as a PURGING gas, and not as a fuel or reactant (like in the JP'314). It is this teaching and only this teaching what prompts the examiner to maintain the above-noted rejection on the ground that if city gas is employed for purging the fuel cell anode, why it (the city gas) cannot be used to purge the fuel cell cathode in a similar fashion in view of settled law *KSR International Co. v. Teleflex Inc.*, 550 US- 82 USPQ2d 1385, 1396 (2007) which supports obviousness rejections based on *yielding predictable results*.*

Thus, the examiner energetically avers that the claim would have been obvious because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Stated differently, simple substitution of one known, equivalent element for another to obtain predictable results is *prima-facie* obvious (*i.e. substitution of the fuel cell anode for the fuel cell cathode*). *KSR International Co. v.*

Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007). What's more, the claim would also have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations. Stated differently, use of known technique to improve similar devices or features (methods, or products) in the same way is *prima-facie* obvious (*i.e. the fuel cell anode vs. the fuel cell cathode*). *KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007)*. In this case, the teachings of the JP'252 clearly shows using city gas for yielding the beneficial and predictable result of purging the fuel cell anode to regulate efficiency (*i.e. temperature profile and operating cost*) of the fuel cell system. Similarly, applying the city gas of the JP'252 to the fuel cell cathode would also yield the beneficial and predictable result of purging the cathode to regulate efficiency (*i.e. temperature profile and operating cost*) of the fuel cell system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Raymond Alejandro/
Primary Examiner, Art Unit 1795